APPENDIX C

ADDITIONAL TABLES & FIGURES

TABLE C1
2002 & 2003 COLLISIONS BY TYPE AND SEVERITY

	2003					2002					
Collision Type	Property Damage Only	Injury	Fatalities	Total	Societal Cost (millions)	Property Damage Only	Injury	Fatalities	Total	Societal Cost (millions)	Change in Total Collisions
Run-Off-Road	430	192	7	**629**	**$22.1**	382	200	6	**588**	**$21.3**	**6.97%**
Rear End	360	217	0	**577**	**$16.3**	345	232	1	**578**	**$18.2**	**-0.17%**
Right Angle	281	174	1	**456**	**$14.0**	292	179	0	**471**	**$13.4**	**-3.18%**
Left Turn	122	87	1	**210**	**$7.4**	126	95	1	**222**	**$7.9**	**-5.41%**
Parked Car	217	18	1	**236**	**$3.5**	202	19	1	**222**	**$3.4**	**6.31%**
Sideswipe	115	42	0	**157**	**$3.4**	63	26	0	**89**	**$2.1**	**76.40%**
Rollover	63	93	2	**158**	**$8.4**	41	80	4	**125**	**$9.4**	**26.40%**
Head On	26	41	1	**68**	**$3.8**	7	23	1	**31**	**$2.5**	**119.35%**
Right Turn	2	1	0	**3**	**$0.1**	4	7	0	**11**	**$0.5**	**-72.73%**
Pedestrian	1	37	1	**39**	**$3.4**	0	38	1	**39**	**$3.5**	**0.00%**
Bicycle	3	23	0	**26**	**$1.5**	1	34	0	**35**	**$2.2**	**-25.71%**
Other	87	46	0	**133**	**$3.5**	108	49	1	**158**	**$4.8**	**-15.82%**
Total	**1707**	**971**	**14**	**2692**		**1571**	**982**	**16**	**2569**		**4.79%**
Societal Cost (millions)	**$10.2**	**$63.1**	**$14.0**	**$87.4**		**$9.4**	**$63.8**	**$16.0**	**$89.3**		**-2.13%**

The following estimated costs per accident are used in this table: PDO-$6,000, Injury-$65,000, Fatality-$1,000,000

TABLE C2
2002 & 2003 RUN-OFF-ROAD COLLISIONS BY OBJECT STRUCK AND SEVERITY

	2003				2002				
Object Struck	Property Damage Only	Injury	Fatalities	Total	Property Damage Only	Injury	Fatalities	Total	Change in Total Collisions
Water/ Embankment	51	34	1	**86**	62	54	1	**117**	**-26.50%**
Utility Pole	64	51	0	**115**	50	50	0	**100**	**15.00%**
Tree or Stump	53	32	1	**86**	46	31	2	**79**	**8.86%**
Fence	80	27	2	**109**	77	21	0	**98**	**11.22%**
Barrier/Guardrail	96	35	3	**134**	77	29	2	**108**	**24.07%**
Mail Box	44	2	0	**46**	33	8	0	**41**	**12.20%**
Sign	38	8	0	**46**	34	6	1	**41**	**12.20%**
Misc/Unidentified	4	3	0	**7**	3	1	0	**4**	**75.00%**
Total	**430**	**192**	**7**	**629**	**382**	**200**	**6**	**588**	**6.97%**

TABLE C3
10-YEAR TRAFFIC VOLUMES, ROAD MILES, AND ACCIDENT RATES

		Average Daily Traffic Volumes (ADT)[1]		Maintained Road Miles			Annual Miles Driven (million miles)[3]			Estimated Accident Rate
Year	Total Collisions	Principle Arterials	All Arterials	Principle Arterials[1]	All Arterials[1]	All County Roads[2]	Principle Arterials	All Arterials	All County Roads[4]	(All County Roads)[5]
1994	4526	11,717	7,595	128	785	2,361	546	2,177	3,273	**1.38**
1995	4136	12,353	6,654	119	513	2,207	538	1,247	2,680	**1.54**
1996	3747	NA	NA	NA	NA	2,169	NA	NA	NA	**NA**
1997	3032	12,849	6,786	119	483	2,048	558	1,196	2,536	**1.20**
1998	2873	NA	NA	NA	NA	1,994	NA	NA	NA	**NA**
1999	2631	12,575	6,849	97	445	1,906	445	1,112	2,382	**1.10**
2000	2433	13,278	6,781	90	437	1,849	434	1,082	2,288	**1.06**
2001	2416	NA	NA	NA	NA	1,832	NA	NA	NA	**NA**
2002	2569	13,441	6,635	88	439	1,895	430	1,062	2,295	**1.12**
2003	2692	13,231	6,531	88	439	1,883	423	1,045	2,244	**1.20**
Change (1994-2003)		**13%**	**-14%**	**-31%**	**-44%**	**-20%**	**-23%**	**-52%**	**-31%**	**-13%**

Data Sources:

1. *Accident Rates for Arterial Roadways, 1994-2003 (Traffic Engineering)*
2. *Road Log Approval Letters, 1994-2003 (CRAB)*
3. *Calculated by multiplying ADT * 365 * maintained road miles*
4. *Estimated value. The average ADT for all arterials used in calculation since ADT is not available for all roadways. The result is divided by two to compensate for lower volumes on local access roadways.*
5. *Calculated by dividing total collisons by annual miles driven. Results in accidents per million vehicle miles.*

TABLE C4
2003 PEDESTRIAN COLLISIONS BY FACILITY AND AGE

Age	Marked Cross Walk	UnMarked Cross Walk	Sidewalk	Shoulder	Roadway	Other	Total
1-4	1	0	1	0	0	0	2
5-9	0	0	0	0	1	0	1
10-14	2	0	0	0	0	1	3
15-19	0	0	0	3	3	1	7
20-24	0	0	0	0	0	0	0
25-44	2	0	0	3	2	2	9
45-64	5	1	2	1	4	1	14
65 and Older	1	0	0	1	1	0	3
Total	**11**	**1**	**3**	**8**	**11**	**5**	**39**

TABLE C5
2002 PEDESTRIAN COLLISIONS BY FACILITY AND AGE

Age	Marked Cross Walk	UnMarked Cross Walk	Sidewalk	Shoulder	Roadway	Other	Total
1-4	0	0	1	1	0	0	**2**
5-9	0	0	0	0	3	0	**3**
10-14	1	0	0	0	3	1	**5**
15-19	3	0	0	0	1	1	**5**
20-24	1	0	0	0	1	2	**4**
25-44	6	0	0	1	3	0	**10**
45-64	2	1	1	0	5	1	**10**
65 and Older	0	0	0	0	0	0	**0**
Total	**13**	**1**	**2**	**2**	**16**	**5**	**39**

TABLE C6
1994-2003 PEDESTRIAN COLLISIONS BY FACILITY AND AGE

Age	Marked Cross Walk	UnMarked Cross Walk	Sidewalk	Shoulder	Designated Bike Route	Roadway	Other	Total
1-4	4	0	2	1	0	1	21	**29**
5-9	5	1	0	0	0	6	28	**40**
10-14	28	0	0	0	2	3	50	**83**
15-19	22	0	1	5	0	6	51	**85**
20-24	12	1	2	1	2	3	18	**39**
25-44	27	2	9	10	0	8	45	**101**
45-64	19	5	6	2	2	10	30	**74**
65 and Older	6	0	0	2	3	2	11	**24**
Total	**123**	**9**	**20**	**21**	**9**	**39**	**254**	**475**

TABLE C7
BICYCLE COLLISIONS BY AGE AND YEAR

Age	2003	2002	1994-2003
1-4	2	0	21
5-9	4	2	60
10-14	4	16	142
15-19	1	5	67
20-24	3	0	24
25-44	10	4	87
45-64	2	8	33
65 and Older	0	0	2
Total	**26**	**35**	**436**

TABLE C8
ACCIDENTS BY COLLISION TYPE AND ROADWAY

		Non-Intersection		Roadway Alignment				
Collision Type	**Intersection[1]**	**Driveway Related**	**Not Driveway Related**	**Tangent and Level**	**Level with Horizontal Curve**	**Tangent with Vertical Grade[2]**	**Curve and Grade**	**Unidentified**
Run-Off-Road	161	5	463	232	127	104	157	9
Rear End	331	1	245	349	14	170	34	10
Right Angle	333	35	88	286	15	127	22	6
Left Turn	160	0	50	123	2	73	11	1
Rollover	21	1	136	37	38	27	55	1
Parked Car	26	19	191	130	23	53	22	8
Sideswipe	48	2	107	62	21	43	28	3
Head On	23	0	45	18	9	13	27	1
Right Turn	2	1	0	2	0	1	0	0
Pedestrian	14	2	23	23	2	11	3	0
Bicycle	15	1	10	13	1	8	4	0
Other	52	1	80	63	9	44	17	0
Total	**1186**	**68**	**1438**	**1338**	**261**	**674**	**380**	**39**

Notes
1. Includes intersection-related collisions that are not at intersection
2. Includes Sag and Crest Verticle Curves

TABLE C9
HAL/HARS Before/After Studies - Breakdown by Improvement Type

Improvement Type	No. Projects	Number w/ Statistically Significant Reduction1	Average Reduction Factor2	Expected Reduction Factor3	Average Annual Reduction in Accident Costs4	Average Project Cost	Average Benefit/Cost Ratio	Average Annual Cost Savings5	Comments
All Way Stop	3	2	42%	55%	$15,500	$9,000	56	$30,000	Cost figures do not include HAL 61 to avoid skewing of data caused by fatality.
Channelization	2	2	61%	25%	$115,000	$42,000	24	$110,000	
LT Lanes	3	3	71%	30%	$78,000	$500	1060	$59,000	Only one project cost available to calculate average project cost, B/C Ratio, and Cost Savings.
LT Lanes w/ Roadway Reconfiguration	2	2	81%	60%	$196,000	NA	NA	NA	
LT Lanes w/ Sight Distance Improv.	1	0	25%	50%	$26,000	NA	NA	NA	
LT Lanes- Total	**6**	**5**	**67%**		**$108,667**	**$500**	**$1,060**	**$59,000**	Only one project cost available to calculate average project cost, B/C Ratio, and Cost Savings.
Roadway Reconfiguration	1	1	63%	40%	$101,000	$63,000	14	$94,000	
New Signal	2	1	57%	25%	$67,000	$126,000	7	$60,000	
New Signal w/ LT Lanes	7	5	62%	45%	$83,000	$628,000	6.1	$115,000	
New Signal w/ Roadway Reconfiguration	1	1	56%	55%	$56,000	NA	NA	NA	
Signal LT Phasing	4	3	66%	40-70%	$141,500	$35,000	97	$206,000	
Signal Coordination	2	2	67%	15%	$295,000	NA	NA	NA	
Signals - Total	**16**	**12**	**68%**		**$112,063**	**$299,250**	**28**	**$109,313**	
Widening	6	5	58%	25%	$143,000	$1,900,000	1.8	$94,000	
Warning Signs	1	0	18%	25%	$4,000	$500	72	$3,900	

Source: Afterstudy Summary, 2003.

Notes: 1. Based on methodology recommended in National Cooperative Research Program (NCHRP) Report 162 using 90% confidence level.
2. Percentage reduction in all accident types except where noted.
3. Agent, Stamatiadis, and Jones, Development of Reduction Factors, University of Kentucky, 1996.
4. The following costs per accident are used in this calculation: PDO-$6,000, Injury-$65,000, Fatality-$1,000,001
5. Reduction in accident costs minus annualized project cost.

FIGURE C1: TRAFFIC ENGINEERING ORGANIZATIONAL CHART